accumulated a reserve for accrued depreciation or a depreciation fund of the same amount.

2. The absence of such a reserve means, however, that the value of the physical plant is by so much overstated, and indicates that, unless an equivalent amount of earnings has been applied to extensions of plant without " charging to capital " or has been invested in other property or has been expended in building up immaterial assets which do not appear on the balance sheet, part of the principal of the investment has, whether intentionally or otherwise, been returned to the proprietors.

3. It is proper, just, and expedient that in valuation for purposes of rate control account should be taken of depreciation of the physical plant, regardless of the need or lack of need for a depreciation fund, and regardless of the actual or hypothetical expectations of the proprietors as to the necessity of reckoning with depreciation by means of the depreciation reserve or otherwise.

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A REPLY

I had not expected that my conclusions on the relation of depreciation and rate control, challenging generally received opinion as they do, would meet with easy acceptance. I am grateful to Mr. Davis for having cogently formulated some of the objections — the more weighty ones, I imagine — that may seem to count against my thesis. The right solution of the problem is a matter of great practical consequence, and discussion which, like Mr. Davis's, helps to define and narrow the issues, contributes toward that end.

We are agreed upon some points. It is admitted that it is not necessary for undertakings with large and varied properties to accumulate a " reserve for accrued depreciation " in order to provide for replacements. It is further admitted that in the valuation of the properties of such companies for the purpose of rate control the usual deduction for depreciation cannot be justified by appealing to the alleged necessity of providing in advance for renewals. But it is upon precisely that fallacious ground, and in most cases upon that ground only, that commissions and courts have based their rulings that depreciation must be deducted in such valuations. Are these findings to be approved in spite of their admittedly faulty premises ? At this point Mr. Davis and myself part company. I see no principles on which the deduction for depreciation can be definitely justified in the case of the valuation of the properties of a company which has not accumulated a depreciation reserve. Mr. Davis thinks that there are such principles, even tho overlooked by commissions and courts, and attempts to formulate them.

But before proceeding to the discussion of the real issue, I must first enter a protest against Mr. Davis's interpretation of part of my argument. In view of the fact (on which we agree) that when annual replacement needs are fairly uniform there is no need to provide a fund for them in advance, I spoke of the reserve for accrued depreciation as " useless for replacement purposes." Mr. Davis fears that I have confused the depreciation reserve with " a thing essentially different, — namely a segregated fund of particular assets, cash, securities, or what not, which may be drawn upon to meet ordinary or extraordinary repairs, renewals, and replacements." Now, I have no fault to find with the exposition of elementary accounting practice which Mr. Davis

introduces at this point. But I cannot understand how Mr. Davis has convinced himself that I fell into the error in question. A reserve of the kind under discussion is built up by credits of depreciation accruals and depleted by debits for replacements. Itself a liability account, its effect is to *hold* a corresponding amount of (unspecified) assets in the business and to prevent their distribution except at the expense of an equivalent diminution in stated liabilities. Only as replacements are made are these assets released. And so far as the reserve is permanent such assets cannot be released in exchange for replacements. To say that the reserve "cannot be used for replacement purposes" avoids much circumlocution and should mislead no one. To use a depreciation reserve for replacements is just as commonplace a feat as to "pay dividends out of profits."

One assertion which Mr. Davis makes in this connection is, I think, a little too strongly put. He says: "The depreciation reserve proper has nothing whatever to do with ability to make expenditures for replacements or renewals, regular or irregular, except in so far as it may insure more comprehensive knowledge of the plant and thereby facilitate intelligent prevision of future needs for such purposes."

Now, of course, the existence of a depreciation reserve does not insure the existence of a body of "idle cash" or of easily convertible assets held against possible replacement needs. But it does make it certain that all needed replacements *up to the amount of the reserve* may be made without either cutting into surplus or increasing the deficit for the year. In practice the reserve for the depreciation of large and varied properties becomes much larger than can be "used" in this way for replacements, and to this extent is "unnecessary" for replacement purposes.

I must repeat a statement which Mr. Davis quotes from my paper: " Altho no investment of a separate depreciation fund is required [by the Interstate Commerce Commission], yet the writing down of the capital assets by the amount of the ' accrued depreciation ' means in the long run either that other assets have to be larger in amount than they otherwise would have been or that liabilities have to be smaller. Usually the growth of the reserve for accrued depreciation means in practice that additional permanent investments are being made out of earnings." This statement is, I think, both accurate and perfectly general. It covers the three methods of handling the matter which Mr. Davis particularizes.

Mr. Davis probes much deeper, it seems to me, when he questions my use of the term " productive efficiency." My argument made some use of the assumption that a properly maintained plant in a state of normal depreciation would yet be in a condition of substantially unimpaired productive efficiency. Mr. Davis formulates his objection to this in two ways. In the first place, he suggests, the value of a plant depends upon its *store* of productive efficiency, and this involves the aggregate expectation of life of the various parts of the plant. This store of productive efficiency is less for a normally depreciated plant than for a new one. In the second place, productive efficiency, adequately interpreted, " must have reference to the relation between the output and the total cost of producing it." When renewals have reached their normal level their annual cost will be greater than in a new plant. A plant requiring larger annual maintenance expenditures per unit of product than a new plant would (in the immediate future) cannot properly be said to be in a state of unimpaired productive efficiency.

The facts in the case are, of course, quite as Mr. Davis suggests. And very likely his use of the term " productive efficiency " is better than mine. Taking all the factors in the situation into account the productive efficiency of a new plant is more than that of an older one. My statement, it will be observed, was carefully qualified. The productive efficiency of an old plant, *properly maintained*, is usually equal to that of a new one similarly constituted. That is, from the factors which may be said really to determine productive efficiency I put aside maintenance and made of it an independently given magnitude. But my argument took full account of the fact that replacement costs are lower during the early years of a plant's life, before it has reached a state of normal average depreciation. Mr. Davis means one thing by " productive efficiency," while I mean another. But we see the same facts.

If the difference between us at this point were purely verbal, — if Mr. Davis merely preferred to give a name to A, B, and C which I had used for A and B, — it would hardly be profitable to pursue the matter further. But to Mr. Davis the higher operating costs of the " depreciated " plant or its smaller store of productive life (both formulations come to the same thing) is a sufficient reason for reducing its valuation for rate regulation. His conclusion depends, however, upon a point of view which I believe to be untenable. It involves, more particularly, a questionable theory of the general nature and meaning of public valuation.

" The relative values of different capital goods," says Mr. Davis, " are determined by the relative amounts of productive power they contain." And he believes that " this productive power is the normal and proper criterion of the value of the physical plant, as for any unit or group of capital goods." With certain minor qualifi-

cations I should concede this, if the " value " wanted were selling value in a supposedly open market. Under certain conditions of expressed or implicit contract with the government, relative productive efficiency (in Mr. Davis's inclusive use of the term) might properly be the dominating criterion of the price to be paid by the government in taking over a public service plant. But valuation for rate control is a very different matter.

There is no better word than value to denote the goal sought in the " valuation " of public service properties. It has the necessary amount of elasticity and it gives the proper suggestion of an ethical element in the problem, — of justice to be attained and apportioned. But it is value for a particular purpose; not the market value of the economists, nor value even as defined in President Hadley's well-considered phrase, " what price ought to be," but value in the special sense of a capital sum on which a fair rate of return is to be conceded. The word value is here used as setting a problem, not as solving one. And one cannot safely attempt to solve the problem by applying principles derived from one specific use of the word. " Value " is nothing to conjure with. It has to be carefully sought.

No commission or court has ever given a set of hard and fast rules by which we might definitely determine the value it would impute to a particular plant. But we do know that no such body has ever made productive power or future earning capacity the fundamental criterion in such matters. Nor have commissions or courts attempted to make value a Janus-faced thing, looking both to the future and the past. Not that forward-looking considerations always have been thrown aside, but rather that emphasis has been placed on the retrospective view. Cost, investment, sacrifice, — these are the controlling factors. Otherwise such items as

" the cost of establishing the business," " interest during construction," and the like, become unintelligible. I cannot ask for space to develop this contention at this time—it would necessitate a review of the whole general theory of valuation—but its soundness will be admitted by all conversant with the matter. What I called the " investment entitled to a return " may not be the only factor in valuation, but it is easily the dominant one.

A possible rejoinder to all this is that the appeal to authority is inconclusive when it comes from one who is questioning the soundness of the findings of that same authority in one very important detail. But altho I believe that my thesis might derive convincing supports from general considerations of equity, the matter cannot now be pursued that far. It is sufficient to show that the treatment of the depreciation problem by courts and commissions has been inconsistent with the general principles of valuation which they themselves have adopted.

If investment is the ruling factor, Mr. Davis's emphasis upon the " store of productive efficiency " is misplaced. The question is not whether a plant in a state of normal depreciation is as " valuable " for productive purposes as a new one. It is merely whether there is a reasonable presumption that the lower operating costs in the first years of a plant which does not accumulate a depreciation reserve involve a virtual return of part of the investment to its proprietors. I see no way of getting at the matter except by weighing the probability that these lower operating expenses were taken into account in determining the amount of the investment and the level of rates.

Mr. Davis holds that " it is not safe to presume that if an allowance for depreciation had been required from the outset investments would not have been made or

would have been smaller." But is it safe to presume that such a requirement would have made no difference to investors? There is, of course, no evidence which directly bears on this point. But there is food for thought in some statistics gathered in 1897 and 1898 by the Commissioner of Labor.[1] For each of eighteen groups in which 375 privately-owned waterworks were classified (on the basis of size) it appeared that the average cost of production per unit of product (including an allowance for interest) was more than the average price charged for the water sold. A similar condition was found in seven of the eleven groups into which 344 privately-owned gas plants were classified.[2] "The explanation of these results," says the editor of the tables, "may be found in the fact that depreciation, which is here included in the cost of production, is, as a rule, not considered by the plants themselves as an actual charge against cost, and that prices are consequently based on cost exclusive of this element."

That these figures are accurate in detail is not to be expected. But the general conclusion to which they point seems to me unmistakable. For many years most public service companies failed to charge to operating costs all of the items which, under present rulings, they are entitled to charge. But their policy was in line with what was current business practice and found support in court decisions. Part, at least, of the immediate saving went to the public in the form of larger facilities or lower rates. And yet we are asked lightly to assume that all of it went back into the pockets of the proprietors.

Because a property administered with a view to continuous operation has reached that normal state where

[1] Water, Gas, and Electric-Light Plants under Private and Municipal Ownership Fourteenth Annual Report of the Commissioner of Labor (1899). See especially pp. 42, 43, 396, 397.

[2] Comparable figures were not given for electric-light plants.

it is about " half worn out," it does not follow that half of the investment, or any part of it, even, has been returned to the stockholders — and that whether their profits have been high or low. Mr. Davis's adherence to the necessarily arbitrary categories of accounting seems to blind him to this simple fact. When he says that to write down the values of present properties for past depreciation involves " no regulation of past actions or profits " he fails to weigh the real effect of this procedure upon a company which made its investment and adjusted its whole business policy in accordance with the admittedly reasonable supposition that operating expenses need not be charged with any burden for the upkeep of capital beyond the cost of proper repairs and renewals. To write down the properties of such a company for depreciation is to adjudge that past profits have contained or should have contained an element representing the return of part of the investment. And when he goes so far as to say, " the investors are not required to disgorge the sums they received in the false guise of profits; they are not required to return the profits actually secured for years when rates were allowed to remain at a level to yield normal income on a capital sum higher than the actual investment," he openly begs the whole question at issue.

Mr. Davis raises the problem of the proper valuation of two similar plants, one of which has regularly charged depreciation to operating expenses, while the other has not. The answer is, of course, that there is a reasonable presumption that one plant has adjusted its investment, its service, and its rates to a higher scale of operating expenses than the other. That is, there is a presumption that one company has collected or planned to collect in rates enough to repay part of its investment. Depreciation might fairly be deducted from the valua-

tion of one, but not from that of the other. The problem is, of course, largely hypothetical. It could not arise in the case of railroads, and but infrequently in that of public utilities.

Let me repeat again that the general question of the justification of the deduction for depreciation is one to which a categorical answer is impossible. The concrete facts in the history of a business do not fall easily into the rigid concepts of modern accounting. Viewed retrospectively, there is no sharp line between principal and interest, between investment and return. Money is expended in building a plant. More money is expended in operating it. All proper renewals are provided for in operating expenses. For the period in question, the present accounting scheme with its regular charges for depreciation is neither compulsory nor in customary use. An annual money income is received, in excess of operating expenditures. How much shall be called net profit? How much shall be counted as repayment of principal? Is there any definite reason to hold that any part of the investment has been repocketed? The question itself is an artificial one, forced upon us as part of the practical problem of regulation. There is, of course, a doubt to be resolved. But I have tried to show that there is a *reasonable presumption* that under the conditions stated it would be unjust to refuse to allow the company to charge rates that would give a fair return on the undepreciated value of its properties.

Mr. Davis's criticism misses the mark because it fails to deal with the fundamental ground on which I based my conclusion that there is such a general presumption. I see no reason to modify that conclusion.

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